

**SPRINKLER DESIGN INTENT – NFPA 13 Systems**  
**2002 NFPA 13, 2002 NFPA 24, and 2006 IBC**  
To Accompany Architectural Review

Listed items require revision/clarification by contractual documentation (i.e., revised drawings, specifications, addenda, etc.) before plans can be approved. *Answers in letter form are not acceptable.* The Design Intent must be submitted by a Tennessee registered fire protection sprinkler system designer. **Starting construction before plan approval may be considered as just cause, by the State, to issue a stop work order. [Rule 0780-2-7-.09]**

### Submittal Requirements

1. Provide two sets of fire protection design drawings with preliminary hydraulic calculations submitted by a Tennessee registered designer.

### Architectural

1. Provide a separate sprinkler system riser for each area of a building separated by a 2/3/4-hour fire-resistance rated structurally independent *fire wall*. The areas are considered separate buildings. [IBC 705.1]

### Underground/Site

1. Provide the following information on a site plan. [NFPA 13 Chapter 10 and NFPA 24 Chapter 10]
  - A. Identify the location and size of the city main at the sprinkler system tap. Show the location of the domestic water tap. All piping from the “*point of service*” including underground used for sprinkler or standpipe system must be installed by a Tennessee registered sprinkler contractor. [Rule 0780-2-7-.08] Show location of “*point of service*” for the underground sprinkler piping on the site plan and provide a note stating that the installation must be performed by a Tennessee registered sprinkler contractor.
  - B. Provide details of the underground piping from the city main to the building identifying: line size and type (6" minimum, unless the requirements of NFPA 13 15.1.3.2 are met), depth of bury (3 ft. minimum), sectional valve locations (PIVs), valve pit, trench detail, and thrust block size and location, etc. [NFPA 24 Chapter 4, 10, and NFPA 13 Chapter 10]
  - C. Identify whether a reduced pressure backflow preventer or meter are present. When used, specify that this equipment is listed for fire protection use. [NFPA 13 15.1.7, 15.1.8.3, and NFPA 24 5.3]
  - D. The fire department connection (FDC) must be on the street side of the building and be located and arranged so that a hose can be attached without interference from any objects, fences, posts, and buildings. [NFPA 24 5.9.5.2 and NFPA 13 8.16.2.4.6]
  - E. The pumper hydrant must be within 100 feet of the fire department connection. [Office Policy]
  - F. Show the fire pump and/or water tank location when required by design. See the additional code requirements listed below in this review based on the Fire Pump and/or Tank Design Intent correction list(s). [NFPA 13 15.2, NFPA 24 5.6, and 5.7]

2. A post indicator valve (PIV) is required for supply lines. [NFPA 24 6.3] The PIV must be electronically supervised by a fire alarm system and should be located not less than 40 feet from the building. [IBC 903.4 and NFPA 13 8.15.1.1.2]
3. Provide fire alarm supervised tamper switches at all underground valves installed in the pit. [IBC 903.4 and NFPA 13 8.15.1.1.2]
4. Service mains must not run under buildings unless special precautions are taken. Provide details showing the method utilized (i.e., arched foundation walls, covered trenching, and isolation valves). [NFPA 24 10.6.2]
5. Provide a lead-in detail where the underground piping passes through the foundation and attaches to the riser. Provide clearance to prevent breakage of the piping due to building settlement. [NFPA 13 15.1.6.2]

## Water Supply Availability and System Demand

1. Identify the sprinkler system occupancy hazard classification for the facility: Light and Ordinary (Groups 1 and 2), Extra (Groups 1 and 2), Special, or Mixed Commodity. [NFPA 13 5.1 thru .6] Commercial kitchens must be Ordinary Group 1. Storage spaces 50 sf or larger, janitor closets, and gas furnace rooms must be Ordinary Group 1. Large stack rooms in Libraries must be Ordinary Group 2. Stage area must be Ordinary Group 2. Laboratories using chemicals must be Ordinary Group 1 or 2. [2004 NFPA 45 4.2.1.1]
2. Provide the following information:
  - A. Identify the hydraulically most demanding area of the building. [NFPA 13 11.2.3.2 and 11.2.3.3]
  - B. Provide preliminary flow (gpm) and pressure (psi) demand calculations for the greatest demand area including required sprinkler head pressure, sprinkler system piping elevation loss, and friction loss (including device friction loss such as backflow preventers and isolation valves). [NFPA 13 11.2.3.1.5 and 14.4.4] Include outside hose demand (gpm). [NFPA 13 11.2.3.1.1]
  - C. Provide a graph plotting the water supply curve (static psi at zero gpm flow and residual psi at gpm flow) and system demand (preliminary calculated point of residual psi at gpm flow) to show that water supply (fire hydrant test) exceeds sprinkler system water demand for the building. [NFPA 13 14.3.4]

## Above-Ground

1. Identify the type of sprinkler system used:

A. Wet Pipe System [7.1]	E. Combined Sprinkler/Standpipe System
B. Dry Pipe System [7.2]	F. Anti-Freeze System [7.5]
C. Preaction or Deluge System [7.3]	G. Combined Dry Pipe, Preaction System [7.4]
D. NFPA 13 R System	H. NFPA 13 D System
2. Provide a sprinkler system riser schematic with control and check valves, backflow prevention devices, supply and system pressure gauges, water flow switches, tamper supervising switches, local waterflow alarm location, and spare sprinkler head cabinet location. [NFPA 13 6.9.2, 8.15.1.1, Figure A 8.15.1.1, 8.15.1.1.2, and 8.16.1]

3. Provide flow test data (static psi, residual psi and gpm, who and when test was performed) for the existing sprinkler system riser when additions to existing systems are made. Provide this information on the plans (two-inch main drain test). [NFPA 13 14.1.3 (30)]
4. Provide the total area protected of each floor for each system riser. The maximum area limitation for the provided number of risers is: Light or ordinary hazard - 52,000 sq. ft. per riser and extra hazard - 40,000 sq. ft. per riser. [NFPA 13 8.2.1]
5. Identify type of aboveground pipe or tube materials used for the sprinkler system. [NFPA 13 6.3. and Table 6.3.1.1]
6. When CPVC piping is used, attach a copy of the Installation Manual on the design plans submittal. [NFPA 13 6.3.6 and Table 6.3.6.1]
  - A. CPVC pipe and fittings are not intended to be installed in combustible concealed spaces where sprinklers are required by NFPA 13 or 13R. [UL VIWT.GuidelInfo]
  - B. CPVC pipe and fittings are intended to be installed in applications where protection is provided. The minimum protection shall consist of either (1) one layer of 3/8 in. gypsum wallboard, (2) a suspended membrane ceiling with lay-in panels or tiles having a weight of not less than 0.35 psf when installed with metallic support grids, or (3) ½ in. plywood soffits. [UL VIWT.GuidelInfo]
7. CPVC pipe and fittings may be installed without protection (exposed) when subject to the following additional limitations:
  - A. Exposed piping is to be installed below a smooth, flat, horizontal ceiling construction. [UL VIWT.GuidelInfo]
  - B. Listed quick-response, ordinary temperature rated pendent sprinklers having deflectors installed within 8 in. from the ceiling or listed residential ordinary temperature rated pendent sprinklers located in accordance with their listing and a maximum distance between sprinklers not to exceed 15 ft. [UL VIWT.GuidelInfo]
  - C. Listed quick-response ordinary temperature rated horizontal sidewall sprinklers having deflectors installed within 6 in. from the ceiling and within 6 in. from the sidewall or listed residential ordinary temperature rated horizontal sidewall sprinklers located in accordance with their listing and a maximum distance between sprinklers not to exceed 14 ft. [UL VIWT.GuidelInfo]
8. Specify all areas to be sprinklered:
  - A. Elevator shafts must be sprinklered at the bottom of the shaft. [NFPA 13 8.14.5]
  - B. Provide sprinkler protection under an accessible first landing of a noncombustible stair and at the top of the stair shaft. [NFPA 13 8.14.3.2.1]
  - C. Provide sprinklers under all combustible ground floors, exterior docks, and platforms. See reference for exceptions. [NFPA 13 8.14.6]
  - D. Provide sprinklers under combustible exterior roofs or canopies exceeding 4 ft. in width. See reference for exceptions. [NFPA 13 8.14.7]
  - E. Provide sprinklers in every aisle and tier for library stack rooms. See reference for exceptions. [NFPA 13 8.14.9]
  - F. Provide sprinklers for electrical equipment rooms. See reference for exceptions. [NFPA 13 8.14.10]
  - G. Provide sprinkler protection for elevator equipment rooms. [NFPA 13 8.14.5.3] The electrical equipment room exception does not apply elevator equipment rooms.

- H. Provide sprinklers at stages, under the stage (if combustible construction or used for storage), and at all adjacent stage areas. [NFPA 13 8.14.15.1] Where proscenium opening protection is required provide a deluge system with open heads no more than 3 feet from the stage side of the opening, and at a maximum of 6 feet on center. [NFPA 13 8.14.15.2]
  - I. Combustible concealed spaces must be sprinklered per NFPA 13 8.14.1. This includes floor-ceilings made with composite wood joists, except where the ceiling is installed directly to the joist or with channels (maximum 1”), the joist channels are firestopped into 160 ft<sup>3</sup> with materials equivalent to the joist construction, and where channels are used, at least 3 ½” of batt insulation is installed at the joist channel. [NFPA 13 8.14.1.2.6]
  - J. For dwelling units, sprinkler bathrooms, closets, and pantries per NFPA 13 8.14.8.
- 9. Provide a heated space for the dry sprinkler system riser. The dry-pipe valve room must be lighted and heated. The source of heat must be a permanently installed type. [NFPA 13 8.15.3.1.3]
  - 10. Show that the sprinkler system is supervised per NFPA 13 8.15.1.1.2 (1 and 2 only) and IBC 903.4:
    - A. Provide tamper switches at all control valves.
    - B. Provide a flow switch or alarm check valve and specify connection to the general building alarm that sounds within 90 seconds of flow. [2002 NFPA 72 5.10.2 and NFPA 13 6.9.1] For systems protecting storage in accordance with NFPA 13 12.3, provide alarm service per NFPA 13 8.16.1.7.
    - C. For high-rise buildings, the requirements of NFPA 13 8.16.1.6 must be met.
  - 11. Specify seismic restraints for sprinkler piping in seismic areas required by IBC 1613. Specify flexible couplings at flexure joints per NFPA 13 9.3.2.1 and, where required, clearance around piping passing through concrete floors and concrete/CMU walls and foundations. [NFPA 13 9.3.4] Provide sufficient information on design drawings showing typical seismic bracing details, location of 4-way bracing, longitudinal and latitudinal bracing, end of the line restraint bracing, and state the clearance required around sprinkler pipe based on pipe size.
  - 12. For protection of special storage and commodities see NFPA 13 Chapter 12.
  - 13. Specify that all system gauges and valves must be accessible for inspection and maintenance. [NFPA 13 8.1.2]
  - 14. Where the potential exists for water pressures exceeding 175 psi, provide a pressure reducing valve meeting the requirements of NFPA 13 8.15.1.2.
  - 15. The proposed sprinkler system solenoid valve used for elevator hoistways and machine rooms would have to be tested and listed for this particular application and be supervised by the fire alarm system to satisfy the code. [NFPA 13 6.1.1 and 8.15.1.1.2] The use of a stand alone solenoid valve serving a dry system branch line for elevator hoistways and machine rooms is not an acceptable alternative to a preaction sprinkler system.

16. Where a water curtain is used to protect glass walls and inoperable windows, specify that “specific application window sprinklers” are used. Unless otherwise listed: (1) the system must be a wet system for interior use or a deluge system for exterior use; (2) the glazing must be non-operable, heat strengthened, tempered, single or double paned, minimum ¼ in. thick; (3) without any horizontal framing members for the glazing frame; (4) the frame must be non-combustible with a standard EPDM rubber gasket seal; (5) the maximum height of the window assembly is 13 ft; (6) heads spacing is a maximum of 6 ft on center or within each glazing segment; and (7) some method must be used to keep combustibles a minimum of 2 in. from the glass. [Office Policy] The sprinkler heads must be arranged so that the entire surface of the glass is wet upon operation of the sprinklers.